11

NCHSR National Health Care Expenditures Study

Eyeglasses and Contact Lenses: Purchases, Expenditures, and Sources of Payment

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Data Preview 11

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
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National Center for Health Services Research

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Background of the Study

Examining how Americans use health care services and determining national patterns of health expenditures and insurance coverage are the goals of a landmark study by the National Center for Health Services Research (NCHSR). A major component of NCHSR's Intramural Research Program, the National Health Care Expenditures Study (NHCES) will provide information on a number of critical issues of national health policy. Topics of particular interest to government agencies, legislative bodies, health professionals, and others concerned with health care policies and expenditures include:

- The cost, utilization, and budgetary implications of changes in federal financing programs for health care and of alternatives to the present structure of private health insurance.
- The breadth and depth of health insurance coverage.
- The proportion of health care costs paid by various insurance mechanisms.
- The influence of Medicare and Medicaid programs on the use and cost of medical care.
- How and why Medicaid participation changes over time.
- Patterns of use and expenditures as well as sources of payment for major components of care.
- The cost and effectiveness of different federal, state, and local programs aimed at improving access to care.
- The loss of revenue resulting from current tax treatment of medical and health insurance expenses, particularly with regard to the benefits currently accruing to different categories of individuals and employers, and the potential effects on the federal budget of proposed changes to tax laws.
- How costs of care vary according to diagnostic categories and treatment settings.

The data for these studies were obtained in the National Medical Care Expenditure Survey (NMCES), which has provided the most comprehensive statistical picture to date of how health services are used and paid for in the United States. The survey was completed in September, 1979.

Data were obtained in three separate, complementary stages. About 14,000 randomly selected households in the civilian, noninstitutionalized population were interviewed six times over an 18-month period during 1977 and 1978. This survey was complemented by additional surveys of physicians and health care facilities providing care to household members during 1977 and of employers and insurance companies responsible for their insurance coverage.

Funding for NMCES was provided by NCHSR, which co-sponsored the survey with the National Center for Health Statistics. Data collection for the survey was done by Research Triangle Institute, NC, and its subcontractors, National Opinion Research Center of the University of Chicago, and Abt Associates, Inc., of Cambridge, MA, under contract HRA 230-76-0268. Data processing support was provided by Social and Scientific Systems, Inc. of Washington, DC, under contracts 233-79-3022 and 233-80-3012.

This report is one of a Data Preview Series that will present estimates of several key measures of health insurance, use, and expenditures for ambulatory services provided by physicians and other health care professionals; inpatient hospital services; dental services; and prescribed medicines.

Even though NMCES was designed to meet specific research goals, NCHSR intends to make the information collected in these surveys available to researchers and other interested persons through public use tapes.

NHCES reports are available from NCHSR, Publications and Information Branch, Room 7-44, 3700 East-West Highway, Hyattsville, MD 20782, 301/436-8970. The graphics and editorial coordinator for this publication series is Maria Friedman.

Additional information on the National Health Care Expenditures Study is available from:

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Eyeglasses and Contact Lenses: Purchases, Expenditures, and Sources of Payment

Daniel C. Walden

Expenses in the United States for vision aids such as eyeglasses and contact lenses exceeded $1.6 billion in 1977. Eighty-four percent of these expenses were paid by the patient's family out of pocket, while private health insurance and other sources of payment paid roughly equal portions of the remainder.

This data preview from the National Health Care Expenditures Study presents population estimates for this component of health services use. Differences among selected population groups are shown in terms of the percentage of the population with or without a purchase or repair of glasses and contact lenses and the frequency of purchases and repairs. Mean charges per purchase or repair, annual expenditures per person with expenses for glasses or contact lenses, and sources of payment are established. Finally, the distribution of the population by out-of-pocket expense for glasses and contact lenses is presented. All findings are from final household data reported for the period January 1 to December 31, 1977 in the National Medical Care Expenditure Survey (see page 7 for the sources and limitations of these data).

Purchase and repair of glasses and contact lenses

In 1977, a total of approximately 26 million persons, or 12.4 percent of the population, purchased glasses or contact lenses or had them repaired. The overall rate was 143 per 1,000 population (Table 1).

The likelihood of such purchases or repairs increased with age, from 8.5 percent for those 6 to 18 years of age to 20.0 percent for those 55 to 64 years. Rates of purchase or repair as well increased with age, from 100 per 1,000 population among the young between 6 and 18 years, to 229 per 1,000 population for those 55 to 64 years, and 193 per 1,000 among adults 65 years or older. Young adults 19 to 24 years of age were more than twice as likely to have purchased contact lenses as those 25 to 54 years. Females were more likely than males to have purchased vision aids or to have had them repaired (12.8 percent, females; 9.8 percent, males) and to have obtained contact lenses (1.5 percent and 0.8 percent, respectively).

Whites were somewhat more likely to have purchased vision aids than blacks or Hispanics. By contrast, differences in family income, education of family head, employment status, and place of residence in an SMSA were not associated with the likelihood of either purchases or repairs among these population subgroups in 1977. Thus, the likelihood of purchasing or repairing glasses or contact lenses was relatively stable around the population total. However, some differences in the rates of purchases or repairs of vision aids per 1,000 population were observed. These rates differed not only between males and females (122 per 1,000 for males and 163 for females) and by ethnic and racial groups, with the rate for whites 155 per 1,000, 97 for blacks, and 124 for Hispanics; they also increased with family income and with education of the family head.

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The Northeast Census region ranked highest both in the percentage of the population with any purchase or repair of vision aids and in rates per 1,000 (13.8 percent and a rate of 170 per 1,000). The South ranked lowest (9.6 percent and 120 per 1,000).

Charges, annual expenditures, and sources of payment

The mean charge for the 24.5 million glasses or contact lenses purchased or repaired for a separate charge in 1977 was $67 (Table 2). Total annual expenses for these items exceeded $1.6 billion, for a mean annual expense of $76 per person with expenses. (Approximately 6 million glasses or contact lenses are not included in these estimates because they were obtained without charge or as a part of a charge for other health services, such as an examination by an ophthalmologist.) Of these expenses, the family paid 84 percent overall; private health insurance and other sources each paid roughly 8 percent.

While mean annual charges were statistically indistinguishable among different population groups, sources of payment differed. The share assumed by private health insurance was relatively high among those 25 to 54 years and the employed (roughly 10 percent for both). The share paid by the family in 1977 for glasses and contact lenses was highest among whites (85.5 percent) and lowest among Hispanics (67.7 percent), for whom other sources paid 26.9 percent. Also, the percentage of annual expenses assumed by different sources of payment was, in general, directly related to family income and years of education of family head. The family paid the lowest share on average where family income was less than $12,000 (77.7 percent) and most when income was $20,000 or above (88.0 percent). Similarly, the percentage paid by the family ranged from 74.2 percent for persons in families where the head had less than 9 years of education to 92.6 percent where the head had 16 or more years of education.

While the percent of annual expenses paid by private health insurance did not vary with family income or education of family head, the share paid by other sources was inversely related to both income and education. These sources assumed a sixth of annual expenses for persons in the lowest income categories, and nearly a fifth for those in families where the head had less than 9 years of education. Out-of-pocket dollar expenditures for glasses and contact lenses, therefore, were highest for families in the upper income bracket and at high educational levels.

The percents paid by the family, private health insurance, and other sources were similar among the other population characteristics (sex, employment status, place of residence, and Census region) shown in Table 2.

Annual out-of-pocket expenses

Approximately 9 percent of the population had out-of-pocket expenses for the purchase or repair of glasses or contact lenses in 1977 (Table 3). For about half of these 19 million persons, 4.5 percent of the population, expenses ranged from $50 to $99. For 3.1 percent of the population, expenses ranged from $1 to $49, and 1.4 percent of the population paid $100 or more out of pocket. Another 3.4 percent of the population obtained glasses or contact lenses without any out-of-pocket expense or were charged for them in conjunction with other health services, so that specific charges and expenditures for glasses and contact lenses could not be identified.

Definition of terms

Purchase or repair of eyeglasses or contact lenses: This description refers to all reported instances of purchase or repair of such items, whether prescribed by a physician, ophthalmologist, or optometrist or obtained without prescription.

Annual expenditures: The sum of charges for eyeglasses or contact lenses purchased or repaired during the period January 1, 1977 to December 31, 1977.

Out-of-pocket expense: The sum of annual expenditures paid by the family.

Table 1. Purchases and repairs of vision aids: Percent of persons with and without purchases or repairs of glasses and contact lenses and mean number of purchases or repairs per 1000 population, by selected population characteristics. *NMCES household data: United States, 1977.*

Population characteristics	Total population (in thousands)	Persons without purchase or repair of glasses or contact lenses	Persons with purchase or repair of glasses or contact lenses	Persons with purchase or repair of glasses only	Persons with purchase or repair of contact lenses only	Purchases or repairs of glasses or contact lenses per 1000 population
		Percent				Mean
Total[a,b,c,d]	212,098	87.6	12.4	11.5	1.1	143
Age in years						
Less than 6	18,216	99.7	*0.3	*0.3	—	*3
6 to 18	50,647	91.5	8.5	7.8	*0.9	100
19 to 24	22,299	86.9	13.1	10.8	3.2	157
25 to 54	78,472	85.7	14.3	13.3	1.4	163
55 to 64	20,180	80.0	20.0	19.8	*0.4	229
65 or older	22,284	83.4	16.6	16.4	*0.6	193
Sex						
Male	102,602	90.2	9.8	9.9	0.8	122
Female	109,496	87.2	12.8	13.1	1.5	163
Ethnic/racial background						
White	147,239	85.9	14.1	13.1	1.4	155
Black	19,573	90.9	9.1	8.8	*0.3	97
Hispanic	8,821	88.6	11.4	11.0	*0.6	124
Family income						
Less than $12,000	74,816	89.0	11.0	10.3	0.9	131
$12,000 to $19,999	55,970	88.1	11.9	11.2	1.1	135
$20,000 or more	80,718	86.1	13.9	12.9	1.4	159
Education of family head						
Less than 9 years	41,295	88.8	11.2	11.3	*0.4	128
9 to 11 years	33,679	89.8	10.2	10.3	*0.7	123
12 years	67,505	88.4	11.6	11.9	1.1	145
13 to 15 years	27,906	87.6	12.4	12.5	1.6	160
16 or more years	32,345	87.3	12.7	12.9	2.5	178
Employment status						
Employed	89,077	86.4	13.6	13.8	1.7	175
Unemployed	5,865	89.4	10.6	10.9	*1.3	134
Not in labor force	69,920	86.5	13.5	13.7	1.1	167
Place of residence						
SMSA	147,419	88.5	11.5	11.7	1.2	148
Other	64,679	89.1	10.9	11.1	0.9	132
U.S. Census region						
Northeast	47,137	86.2	13.8	14.0	*0.7	170
North Central	58,039	88.0	12.0	12.1	1.4	151
South	67,357	90.4	9.6	9.8	1.0	120
West	39,565	89.5	10.5	10.7	1.4	138

[a]Includes all other ethnic/racial groups not shown separately. [b]Includes persons with negative income. [c]Includes persons with unknown education. [d]Includes all those not in the labor force but less than 14 years of age. *Relative standard error is equal to or greater than 30 percent. — Quantity zero.

Source: National Center for Health Services Research.

Table 2. Annual expenditures and sources of payment for purchases and repairs of vision aids: Mean charge per purchase or repair, mean expense per person with expense, and percent paid by source of payment. *NMCES household data: United States, 1977.*

Population characteristics	Number of purchases or repairs with charge (in thousands)	Mean charge per purchase or repair	Number of persons with expense (in thousands)	Mean annual expense per person with expense	Source of payment		
					Family	Private health insurance	Other[a]
		$		$	Percent distribution		
Total[b,c,d,e]	24,515	67	21,581	76	84.0	7.9	8.0
Age in years							
Less than 6	~	~	~	~	~	~	~
6 to 18	4,117	*56	3,573	65	85.2	5.2	9.6
19 to 24	2,925	*63	2,552	73	85.2	8.3	6.4
25 to 54	10,233	69	9,110	77	84.6	10.2	5.1
55 to 64	3,801	*72	3,331	82	86.5	7.1	6.3
65 or older	3,375	*73	2,957	84	78.8	4.2	16.7
Sex							
Male	10,135	64	8,943	73	83.1	9.5	7.2
Female	14,380	69	12,638	79	84.6	6.8	8.5
Ethnic/racial background							
White	18,112	67	16,796	72	85.5	8.2	6.1
Black	1,626	*70	1,514	75	75.7	4.6	19.7
Hispanic	957	*69	915	73	67.7	5.4	26.9
Family income							
Less than $12,000	8,005	67	6,743	79	77.7	5.4	16.8
$12,000 to $19,999	5,966	69	5,397	76	85.6	8.5	5.7
$20,000 or more	10,445	66	9,358	74	88.0	9.4	2.4
Education of family head							
Less than 9 years	4,046	*66	3,678	73	74.2	6.4	19.4
9 to 11 years	3,213	*65	2,858	74	76.6	8.5	14.8
12 years	8,016	66	7,061	75	84.8	9.3	5.7
13 to 15 years	3,614	*69	3,196	78	87.0	9.8	3.2
16 or more years	4,901	*69	4,217	80	92.6	5.3	2.0
Employment status							
Employed	12,481	69	11,064	77	86.1	10.4	3.3
Unemployed	617	*58	549	65	82.0	5.4	*12.5
Not in labor force	9,482	70	8,272	80	82.7	4.9	12.3
Place of residence							
SMSA	18,106	67	15,766	77	84.0	7.9	7.9
Other	6,410	67	5,814	74	84.1	7.7	8.2
U.S. Census region							
Northeast	6,742	58	5,835	67	81.4	8.9	9.7
North Central	6,813	68	6,030	77	86.3	8.1	5.6
South	6,565	70	5,875	78	88.8	4.6	6.6
West	4,396	*75	3,841	86	77.4	10.8	11.3

[a]Includes Medicare and Medicaid, CHAMPUS, CHAMPVA, the Indian Health Service, the Veterans Administration, the military, other federal, state, city or county payers, philanthropic institutions, and unknown sources of payment. [b]Includes all other ethnic/racial groups not shown separately. [c]Includes persons with negative income. [d]Includes persons with unknown education. [e]Includes all those not in the labor force but less than 14 years of age. ~The sample cell size was not large enough to estimate the population figure. *Relative standard error is equal to or greater than 30 percent. **Source: National Center for Health Services Research.**

Table 3. Out-of-pocket expenses for vision aids: Percent distribution of persons with and without purchases or repairs of glasses or contact lenses, by intervals of out-of-pocket expenses. *NMCES household data: United States, 1977.*

Population characteristics	Total population (in thousands)	Out-of-pocket expense				No purchase or repair
		None[a]	$1–49	$50–99	$100 or more	
		Percent distribution				
Total[b,c,d,e]	212,098	3.4	3.1	4.5	1.4	87.6
Age in years						
Less than 6	18,216	*1.0	*0.2	*0.2	0.0	99.7
6 to 18	50,647	2.3	2.6	2.9	*0.7	91.5
19 to 24	22,299	2.8	3.7	5.0	1.6	86.9
25 to 54	78,472	3.8	3.6	5.2	1.7	85.7
55 to 64	20,180	4.9	3.8	8.1	3.2	80.0
65 or older	22,284	4.9	4.0	5.6	2.1	83.4
Sex						
Male	102,602	0.7	3.1	4.5	1.5	90.2
Female	109,496	2.4	3.4	5.2	1.8	87.2
Ethnic/racial background						
White	147,239	3.6	3.8	5.3	1.4	85.9
Black	19,573	2.9	1.7	3.4	1.1	90.9
Hispanic	8,821	3.8	2.5	3.8	*1.3	88.6
Family income						
Less than $12,000	74,816	3.6	2.5	3.6	1.3	89.0
$12,000 to $19,999	55,970	3.0	3.0	4.5	1.4	88.1
$20,000 or more	80,718	3.2	3.7	5.3	1.7	86.1
Education of family head						
Less than 9 years	41,295	4.1	2.4	3.8	*0.9	88.8
9 to 11 years	33,679	2.9	2.8	3.3	*1.2	89.8
12 years	67,505	2.0	3.5	4.6	1.5	88.4
13 to 15 years	27,906	1.8	3.3	5.6	1.7	87.6
16 or more years	32,345	2.0	4.0	6.0	2.5	87.3
Employment status						
Employed	89,077	2.2	3.8	5.6	2.0	86.4
Unemployed	5,865	2.8	2.7	4.1	*1.0	89.4
Not in labor force	69,920	3.0	3.4	5.3	1.8	86.5
Place of residence						
SMSA	147,419	3.0	3.3	4.6	1.7	88.5
Other	64,679	3.7	2.7	4.3	1.1	89.1
U.S. Census region						
Northeast	47,137	3.5	4.9	4.7	1.4	86.2
North Central	58,039	3.7	3.0	5.1	1.4	88.0
South	67,357	2.5	2.4	4.2	1.4	90.4
West	39,565	3.6	2.5	3.9	1.8	89.5

[a]Includes also flat-fee purchases and repairs. [b] Includes all other ethnic/racial groups not shown separately. [c]Includes persons with negative income. [d]Includes persons with unknown education. [e]Includes all those not in the labor force but less than 16 years of age. 0.0 indicates quantity greater than 0.00 but less than 0.05. *Relative standard error is equal to or greater than 30 percent. **Source: National Center for Health Services Research.**

Sources and Limitations of the Data

The data in this report were obtained in the major survey component of the National Medical Care Expenditure Survey (NMCES). In five rounds of household interviews, information was elicited on the use of and expenditures for health services. The survey reference period was January 1 to December 31, 1977. For the interview instruments, see *NHCES Instruments and Procedures 1* (Bonham and Corder, 1981). Information supplied by the respondent was amended in each round through the household summary update process, which allowed the respondent to correct or add to the information provided in previous interviews. Trained interviewers then updated a computer-generated summary of both expenditures and sources of payment for health care previously reported by the respondent. In the fifth interview, respondents reviewed with the interviewer each reported event of health care shown in the household summary.

Imputation of missing data

For approximately 28 percent of all purchases or repairs of glasses or contact lenses in the sample, data on charges remained missing or incomplete; data on sources of payment were missing for approximately 23 percent. These data were imputed using a method developed at the U.S. Bureau of the Census for their *Current Population Reports* series.

This procedure imputes data for individuals with complete information to individuals with missing data but similar characteristics. Variables with known values for all individuals in the survey (e.g., age, U.S. Census region) were used to form groups of donors with known data on purchases and repairs of glasses and contact lenses and identical groups of recipients with missing data. Within such groups, data were randomly assigned from donors to recipients.

Flat fees and items obtained at no charge

For approximately 19.4 percent of the purchases or repairs of glasses and contact lenses shown in Table 1, charges were part of a flat fee: i.e., they were included in the total charge for a related health service, such as an examination by an ophthalmologist or optometrist. Since it was not possible to identify the specific portion of the flat-fee charge associated with such purchases or repairs, these are included in the "no out-of-pocket expense" column in Table 3, but are excluded from the estimates of mean charges, annual expenses, and sources of payment shown in Table 2. Such flat-fee charges will be contained in estimates of charges and expenditures for vision services in ambulatory care settings.

Also, glasses or contact lenses repaired or obtained without charge from the provider or under a prepaid group practice arrangement are included in the estimates in Table 1 and Table 3, but omitted from the estimates of mean charges and expenditures in Table 2. These amounted to approximately 0.7 percent of all glasses or contact lenses repaired or obtained.

Sources of payment

The share borne by different sources of payment of total annual expense per person with expense is expressed as a percent and is calculated by summing all payments by a specific source for all items or events and dividing them by total expenditures. Averages given for the respective sources do not reflect actual patterns of payment. For example, Medicaid usually pays either all or none of the specific charge.

Where the sum of percents reported for several sources of payment exceeded 100 per purchase or repair, the amounts paid by the family out of pocket were reduced to make the sum of percents paid by all sources equal to 100 percent. If the sum of percents reported paid by all sources was less than 100 percent per purchase or repair, the remainder was assigned to the "other" source of payment category.

Population characteristics

Family income. Incomes as reported for each member of the family during round 5 were summed across income types and family members to yield measures of total annual gross family income. The results approximated data from the March 1977 *Current Population Survey* of the U.S. Census Bureau on total income per family and the percent distribution of persons and families by categories of family income.

Employment Status. Employment status was based on household reports during round 5. Persons were defined as employed if they worked for pay during the week preceding the round 5 interview. Persons were defined as unemployed if they had not worked for pay during the week before the round 5 interview, were not full-time students, and were either laid off or looking for work. Persons not in the labor force include all civilians 16 years or older not classified as employed or unemployed by these definitions. The sample was categorized to match population data from the Bureau of Labor Statistics on the percent distribution of persons 16 years of age or older by employment status for December 1977.

Race/Ethnicity. Classification by racial/ethnic origin was developed from a series of questions asked in the round 5 interview. Persons 17 years of age or older were asked if their racial background were best described as American Indian or Alaskan Native; Asian or Pacific Islander; black; white; or other. They also were asked if their main national origin or ancestry was among one of the following:

- Puerto Rican
- Cuban
- Mexican
- Mexicano
- Mexican-American
- Chicano
- Other Latin American
- Other Spanish

All persons who claimed main national origin or ancestry in one of these groups were classified as Hispanic, regardless of racial background. Other persons were then classified as white, black, or other depending on their reported racial background.

These classifications were extended to the under 17 population based on family relationship codes. Persons who dropped out of the survey prior to round 5 are coded as unknown.

Technical Notes

Sample design

The survey sample was designed to produce statistically unbiased national estimates that are representative of the civilian noninstitutionalized population of the United States. To this end, the study used the national multistage area samples of the Research Triangle Institute and the National Opinion Research Center. Sampling specifications required the selection of about 14,000 households. Data were obtained for about 91 percent of eligible households in the first interview and 82 percent by the fifth interview. Approximately 11 percent of all survey participants provided data for only some of the time in which they were eligible to respond. Information for these respondents was adjusted to account for this partial nonresponse (Cohen, 1981). For a detailed description of the survey sample and of sampling, estimation, and adjustment methods, including weighting for nonresponse and poststratification, see Cohen and Kalsbeek, 1981.

Reliability of estimates

Since the statistics presented in this report are based on a sample, they may differ somewhat from the figures that would have been obtained if a complete census had been taken. This potential difference between sample results and a complete count is the sampling error, which is measured by a statistic called the standard error of the estimate.

The chance that an estimate from the sample would differ from a complete census by less than one standard error is about 68 out of 100. The chance that the difference between the sample estimate and a complete census would be less than twice the standard error is about 95 out of 100.

Tests of statistical significance were used to determine whether differences between population estimates exist at specified levels of confidence or whether they simply occurred by chance. Differences were tested using Z-scores having asymptotic normal properties, based on the rounded figures at the 0.05 level of significance. Unless otherwise noted, only statistically significant differences between estimates are discussed in the text.

It should be noted that the NMCES sample size and the variation in charges for glasses and contact lenses constrain the interpretation of mean charges for some of the population groups. For most of the estimates of the mean charge shown in Table 2, for example, the relative standard error was at least 30 percent, which indicates that the actual charge in 1977 may have been at least 30 percent higher or lower than that shown.

Rounding

Estimates as presented in the tables are rounded to the nearest tenth of a percent or proportion and to the nearest dollar.

Estimated standard errors

Standard errors for the statistics presented in this paper were approximated, by interpolation where necessary, using a curve smoothing procedure developed at the National Center for Health Services Research (Cohen, 1979).

Relative standard errors

Totals: Where the statistics of interest are total estimates (T) of the population, of purchases or repairs of glasses or contact lenses, or of expenditures, an estimate of the standard error, SE, can be obtained by multiplying the relative standard error, expressed as a percent, of the respective T, RSE(T), by T, and then dividing by 100. Thus,

$$SE(T) = \frac{T(RSE(T))}{100}$$

For estimated population totals, the approximate relative standard errors expressed as percent are as follows:

Table I

Estimated population totals (in thousands)	Relative standard error (%)
500	18.9
1,000	13.5
2,500	8.7
5,000	6.4
10,000	4.8
25,000	3.5
50,000	3.0
100,000	2.6
200,000	2.4

Example: An estimate of 26.3 million persons in the U.S. population with at least one purchase or repair (212,098,000 x .124, Table 1) has a relative standard error of approximately 3.5 percent (Table I). The standard error of this estimate, then, is

$$SE(T) = \frac{26,300,000(3.5)}{100} = 920,500$$

For the estimated number of purchases or repairs of glasses or contact lenses, the approximate relative standard errors expressed as percent are as follows:

Table II

Estimated number of purchases or repairs (in thousands)	Relative standard error (%)
500	13.1
1,000	9.5
2,500	6.5
5,000	5.1
10,000	4.2
25,000	3.5
50,000	3.3
100,000	3.2
250,000	3.1
500,000 or above	3.1

For the estimated expenditures for glasses or contact lenses, the approximate relative standard errors expressed as percent are as follows:

Table III

Estimate of expenditures (in thousands)	Relative standard error (%)
$25,000	14.2
50,000	10.5
100,000	8.1
250,000	6.2
500,000	5.4
1,000,000	5.0
2,500,000	4.7
5,000,000	4.6
10,000,000	4.5
25,000,000 or above	4.5

Ratios: When the statistic of interest is a ratio, Y, such as a rate, mean or percent, both the relative standard error of the numerator, RSE(N), and the relative standard error of the denominator, RSE(D), must be considered. Thus, Y = N/D, and the standard error of Y is:

$$SE(Y) = Y \frac{\sqrt{RSE(N)^2 + RSE(D)^2}}{100}$$

where

$$Y = \frac{\text{number of purchases}}{\text{number of population}}$$

or

persons with purchase

for the mean number of purchases per population or person with purchase;

$$Y = \frac{\text{sum total of charges}}{\text{number of purchases with charge}}$$

for the mean charge per purchase;

$$Y = \frac{\text{total expenditures}}{\text{persons with expense}}$$

for mean expense per person with expense;

$$Y = \frac{\text{total paid by source}}{\text{total expenditures}}$$

for the percent of expenses attributed to each source of payment.

Example: For the standard error of the mean expense for the purchase or repair of glasses or contact lenses per person with expense ($76; Table 2), the relative standard error of the numerator, SE(N), is 4.9 percent (21,581,000 persons with expense × 76 = $1.6 billion, Table III); and the relative standard error of the denominator is approximately 3.8 (Table I). Then the standard error is:

$$SE(\$76) = \$76 \frac{\sqrt{(4.9)^2 + (3.8)^2}}{100} = \$4.71$$

Direct standard error estimates

When the statistic of interest is expressed as a person based measure, direct estimates of standard errors have been derived for ease of calculation. For the estimated percent of persons with or without at least one purchase or repair of glasses or contact lenses, approximate standard errors expressed as percent are as follows:

Table IV

Persons in the base of the percent (in thousands)	Estimated percent						
	2 or 98	5 or 95	10 or 90	20 or 80	30 or 70	40 or 60	50
	Approximate standard error (in percent)						
1,000	1.9	2.9	4.0	5.3	6.1	6.5	6.6
2,500	1.2	1.8	2.5	3.4	3.8	4.1	4.2
5,000	0.8	1.3	1.8	2.4	2.7	2.9	3.0
10,000	0.6	0.9	1.3	1.7	1.9	2.1	2.1
25,000	0.4	0.6	0.8	1.1	1.2	1.3	1.3
50,000	0.3	0.4	0.6	0.8	0.9	0.9	0.9
100,000	0.2	0.3	0.4	0.5	0.6	0.7	0.7
200,000	0.1	0.2	0.3	0.4	0.4	0.5	0.5

Example: The estimate of 12.4 percent of the U.S. population with at least one purchase or repair of glasses or contact lenses in 1977 is based on a population total of 212,098,000 (Table 1). This estimate has a standard error of approximately 0.3 percent.

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Available NHCES Publications

NHCES Data Preview 1: Who Are the Uninsured? One surprise of this study was the large number of persons who reported being uninsured -- 26.6 million persons or about 12.6 percent of the civilian population. (This excludes persons serving in the armed forces and residents of nursing homes, prisons, and long-term psychiatric hospitals.) The study also showed that in 81.4 percent of U.S. families, every member was covered by some type of insurance from January to March 1977. There were no differences in insurance coverage between men and women, but there were variations according to age, color, and geographic groups. Of six age groups studied, persons 18 to 24 were most likely to be without coverage. In this group, 21.9 percent of all persons lacked coverage. A large difference was noted in coverage between whites and all other races. Twelve percent of whites were found to be without coverage compared with 18 percent of all other races. Persons with relatively few years of education were more likely to be without coverage: 15.5 percent of those with less than 12 years of education (and over 17 years old) had no coverage, compared with 12.1 percent of high school graduates and 8.9 percent of persons who had 13 years or more of education. Urban populations had greater coverage than rural ones, with 18 percent of rural residents lacking coverage while only 10.4 percent of those living in the 16 largest urban areas were not covered.

NHCES Data Preview 2: Charges and Sources of Payment for Dental Visits with Separate Charges. In a survey of dental visits during the first quarter of 1977, for which a separate charge was made for each visit, the average cost of the visit was reported to be $31.71, of which 77 percent was paid by the patient or his family. Private health insurance paid 13 percent of the charge and 10 percent was paid by public sources such as Medicaid. Payment for more than 90 percent of all dental visits came from only one source. Among age groups, the average charge for dental visits was $35.60 for adults 20 to 44 and $22.31 for children 12 or younger. Generally, the proportion of the dental bill paid by the family increased as the patient grew older. The lowest proportion of the bill paid by the family was for children 12 or under -- 67 percent; persons 45 to 64 paid 83 percent of the bill; and those 65 and older paid 93 percent. There were no significant differences between the average bill received by whites and all other races, but the average proportion of those bills paid by private health insurance did vary significantly. Whites paid 78 percent of the bill, while all others paid 61 percent. A large proportion of charges for the latter group was paid by public sources. The average charge for dental visits did not vary significantly with the education of the patient. However, the average proportion paid by the family increased with the education level, from 72 percent for persons with 11 years of education or less to 80 percent for persons with 12 years, and 85 percent for those with 13 years or more.

NHCES Data Preview 3: Who Initiates Visits to a Physician? Since a physician's income is influenced by how often patients are seen, the question of who initiates a visit to a physician is an important one. This Data Preview looks at how often visits to the doctor were initiated by physicians and by patients during the first three months of 1977. The medical appropriateness of the visits was not taken into account. Results indicate that about 60 percent of the visits were initiated by patients, while about 36 percent were initiated by physicians by making an appointment with the patient during a previous visit. As the age of the patient increased, physician-initiated visits increased. Only 23 percent of visits were physician-initiated for children up to age 18. For persons in the 55- to 64-year age group, about 46 percent of the visits were initiated by a physician. There were no statistical differences in the percentage of physician-initiated visits with respect to sex, color, or education. The percentage of physician-initiated visits rose with the density of physicians in a state. For states with less than 100 physicians per 100,000 persons, 31.1 percent of the visits were initiated by physicians; for states with 175 or more physicians per 100,000 persons, 39.6 percent of the visits were initiated by physicians. In the physician's office, 36.3 percent of the visits were initiated by the physician, with 59.8 percent initiated by the patient. In hospital outpatient clinics, 50.7 percent of the visits were initiated by the physician, with 44.8 percent initiated by the patient; in hospital emergency rooms, 89.2 percent of the visits were initiated by the patient and 6.2 percent by the physician.

NHCES Data Preview 4: Health Insurance Coverage of Veterans. During the first quarter of 1977, slightly more than 11 percent of veterans, or about three million men 20 years or older, were uninsured compared with 14.5 percent of men in the general population. The exception to veterans' relatively high level of insurance coverage was the youngest age group -- 20 to 25 years of age -- in which 34.6 percent were found to be uninsured compared to 24.0 percent of men who had not served in the armed forces. Three-quarters of veterans had private health insurance compared to about 64 percent of men in the general population. It was relatively infrequent for veterans to be covered by public insurance, such as Medicare and Medicaid, except for disabled veterans, who were considerably more likely to be covered by such public programs and much less likely than other veterans to have private health insurance. When comparing insurance coverage for veterans with men in the general population on the basis of color, education, and region of residence, a greater percentage of veterans were found to be insured. However, for both veterans and nonveterans, highly educated men were more likely to have health insurance; white men were more likely to be insured than all others; and higher percentages of men had insurance in the Northeast and North Central regions of the country than in the South and the West.

NHCES Data Preview 5: Charges and Sources of Payment for Visits to Physician Offices. The mean charge for a physician office visit during the first quarter of 1977 was $21.29. Of this, an average proportion of 0.69, or $14.69, was paid by the patient or his family. Private health insurance paid an average proportion of 0.16, Medicare 0.04, and Medicaid 0.07, with the remainder being paid by other public sources. Among age groups, the average cost of an office visit was lowest for children 5 years or younger ($14.62). As patients' education level rose, so did the average cost of a

doctor's visit, ranging from a high of $28.10 for persons with 16 or more years of education to $18.91 for persons with 11 years or less. Urban dwellers were charged more for a doctor's office visit than residents of rural areas. Charges also varied by geographical region, with highest charges found in the West ($28.01). Residents of the North Central region paid $18.08, the Northeast $21.02, and the South $20.39. The average charge for an office visit did not significantly differ according to sex or racial group.

NHCES Data Preview 6: Waiting Times in Different Medical Settings: Appointment Waits and Office Waits. In early 1977 the average wait for an appointment in ambulatory care settings was seven days. The waiting time for an appointment for all types of services was longer in hospital outpatient departments (10.1 days) than in physician offices (6.9 days). For visits associated with preventive services such as prenatal and postnatal care or eye examinations, the wait was much longer, averaging 14.1 days for visits in a doctor's office. Waiting times were shortest for children less than six years old. Generally, females waited longer than males for an appointment (7.8 days compared to 5.9 days), and whites waited longer than other racial groups (7.2 days, white; 5.3 days, all others). Persons living in urban areas waited roughly one day longer to see a doctor than rural residents. In the first quarter of 1977, patients waited an average of 31 minutes to see a physician in all care settings. The average waiting time in a doctor's office was 29 minutes, in a hospital outpatient department 45 minutes, and in a hospital emergency room 38 minutes. While little difference was noted in waiting times across age groups or by sex, a significant difference was found between whites and other racial groups: whites waited an average of 28 minutes in the doctor's office compared to an average of 40 minutes for all other groups. This disparity was even more pronounced in hospital outpatient departments, where whites waited an average of 41 minutes and others 61 minutes.

NHCES Data Preview 7: Employer and Employee Expenditures for Private Health Insurance. Although 88.3 percent of American employees worked for organizations that offered some form of health insurance plan, the availability of the plan and the employee's share of the premium burden varied considerably, depending on the size of the firm, its union status, and the percentage of low-wage employees on the payroll. Larger firms and those with union contracts were more likely to offer health insurance plans to their employees and to assume a greater share of the premium cost. However, in organizations where more than half of the workforce earned low or minimum wages, 30.7 percent of the workers -- almost three times the national average -- could not obtain health insurance through their jobs. Also, low or minimum-wage workers were least likely to be eligible for health insurance plans that were offered on the job.

NHCES Data Preview 8: Dental Services: Use, Expenditures, and Sources of Payment. About 60 percent of the American people do not see the dentist every year. But nearly 8 million people do, and their dental care costs total more than $12 billion annually. The family pays about three-quarters of these costs out-of-pocket, making dental services one of the family's most expensive types of health care. Not surprisingly, children see the dentist most often, with half of those between six and 18 having at least one dental visit during the year. Whites see the dentist more often than minorities. Nearly half of all whites see the dentist at least once during the year, compared to 23 percent of blacks and 30 percent of Hispanics. Family income and education also make a difference. Individuals in families earning more than $20,000 annually are 20 percent more likely to have a dental visit than people whose families make less than $12,000. Nearly two-thirds of those in families headed by a person with 16 or more years of education obtain dental care during the year, compared to only a fourth of those in families headed by someone with fewer than nine years of schooling. The family's share of dental care costs varies considerably by age. The family pays the lowest share (60.2 percent) for children under six, but about 90 percent of annual expenses incurred by the elderly. Sources of payment also vary according to racial and ethnic background. Private health insurance assumes a relatively large share of dental care costs for blacks--29.3 percent compared to 16.1 percent for Hispanics, and 18.2 percent for whites. Medicaid pays for roughly a tenth of annual dental care expenditures for minorities, but less than two percent for whites.

NHCES Data Preview 9: Prescribed Medicines: Use, Expenditures, and Sources of Payment. About 60 percent of the American people, or about 120 million individuals, obtain a prescription medicine each year. The medicines--drugs, ointments, refills, and other items prescribed by a doctor--are used most by the elderly, who average slightly more than 14 during the year. Those between 55 and 64 average nearly 12, people 25 to 54 obtain about seven, and those 18 or younger average around four, counting only those who obtained at least one prescription item during the year. Prescribed medicines cost an average of $6.24 each in 1977, with total expenditures reaching $5.5 billion. Nearly three-quarters of those total costs are paid by the family out-of-pocket, with private insurance paying about 12 percent, Medicaid nearly eight percent, and other sources about six percent. Study results show that overall expenditures for prescribed medicines are highest for the elderly, who incur the highest average annual expenses as well as the most out-of-pocket costs. For example, each person 65 or older spent about $93 in 1977 on prescribed medicines--about 15 percent more than those in the second-highest expenditures group and nearly five times more than those 18 or younger. Nearly half of the 10 million people with out-of-pocket expenses exceeding $100 are 65 or older. Females are more likely than males to obtain prescription medicines, have higher rates of use, and higher mean annual expenses for the medicines. The family pays a higher share of prescribed medicine costs among whites than non-whites. Private insurance pays about 15 percent of whites' average annual expenses for prescribed medicines, but less than seven percent for blacks and Hispanics. However, Medicaid picks up about 25 percent of annual prescribed medicine expenses for blacks and Hispanics, or about five times the share for whites. Annual expenses and sources of payment also vary slightly among geographic regions. Mean annual expenses are highest in the South, where

private health insurance contributes least to such expenses. Families in the West pay slightly less than the national average for prescribed medicine costs.

NHCES Data Preview 10: Medical Equipment and Supplies: Purchases and Rentals, Expenditures, and Sources of Payment. About 13 million people, or 6.2 percent of Americans, purchase or rent medical equipment and supplies each year. Not surprisingly, a disproportionate number of these people are elderly, who are twice as likely as the rest of the population to obtain wheelchairs, crutches, corrective shoes, supportive devices, hearing aids, syringes, needles, and similar items. In 1977, the average charge for a purchase or rental was $48, with total cost per person making a purchase or rental running around $70 for the year. Most people paid less than $25 of those costs out-of-pocket. However, people 65 or older are twice as likely as the rest of the population to spend $25 or more of their own money each year buying or renting medical equipment and supplies. The elderly also are four times as likely as adults 25 to 54 to pay more than $100 out-of-pocket. Families with elderly members not only incur higher expenses than the average family, but also pay a considerably higher share of those expenses for their medical equipment and supplies. That is because expenditures by the elderly for medical equipment and supplies are about 50 percent higher than the national mean.

NHCES Instruments and Procedures 1: NMCES Household Interview Instruments. This report reproduces and discusses the questionnaires used in collecting data in the household portion of the National Medical Care Expenditure Survey (NMCES). The bulk of the report focuses on the core questionnaire, the main data collection instrument for the survey, which covered such areas as disability days, the use of various types of health services, and associated charges and sources of payment for those services. Also included are supplements to the core questionnaire, related survey control and summary forms, and other kinds of instruments used in obtaining data from the 14,000 participating households. Of particular interest are the sections in the report describing the structure of the household interviews, the location of specific groups of questions in the various instruments, and the types of data collected for each instrument during one of the six rounds of interviews. These sections explain the reasons for survey design, and relate specific items in the instruments to the information requirements of the National Health Care Expenditures Study, for which NMCES was the data-gathering component.

NHCES Instruments and Procedures 2: Estimation and Sampling Variances in the Household Survey. This report explains the sample design and associated methods of variance estimation for the household portion of the National Medical Care Expenditure Survey (NMCES). The first part focuses on how participants were selected through two independent, four-stage probability samples of the civilian, non-institutionalized population. Emphasis is placed in the second portion of the report on the sampling weights. Sample estimation for the household portion of NMCES was designed to give disproportionately greater representation to families lacking health insurance. Because this design was not self-weighting, particular importance was placed on the development of appropriate sampling weights. The new report describes how those sampling weights reflected the expected number of units in the survey population accounted for by each sampling unit, multiplied by a number of adjustment factors. These included compensation for nonresponse, post-stratification and for the combination of samples. Estimation equations are detailed, and problems of variance estimation from complex sample survey designs are discussed in terms of NMCES. Several alternative variance estimators are reviewed, such as the Taylor series linearization method, and the use of fitted relative variance curves is described.

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